

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.-48. (Canceled)

49. (Currently Amended) A gas stream vortex mixing system for mixing a gas stream, the gas stream vortex mixing system comprising:

a duct provided with an inner surface defining a passageway for communicating a gas stream;

a wing having a first end, a second end, an upper surface, and a lower surface, wherein the wing is non-movably coupled within the passageway of the duct and configured to shed a vortex in the gas stream at an edge of the second end of the wing, the first end and second end extend into the passageway, the first end ~~is configured to be~~ positioned upstream of a direction of travel of the gas stream, and the second end ~~is configured to be~~ positioned downstream of the direction of travel of the gas stream; and

a nozzle to discharge a mixture into the gas stream,  
wherein

the nozzle is located adjacent the edge of the second end of the wing; and

the nozzle is positioned to discharge such that the nozzle discharges the mixture into the vortex in

the gas stream at a point where the vortex is shed.

50. (Previously Presented) A gas stream vortex mixing system for mixing a gas stream, the gas stream vortex mixing system comprising:

a duct provided with an inner surface defining a passageway for communicating a gas stream;

a wing having a first end, a second end, a upper surface, and a lower surface, wherein the wing is non-movably coupled within the passageway of the duct and configured to shed a vortex in the gas stream at an edge of the second end of the wing, the fist end and second end extend into the passageway, the first end positioned upstream of a direction of travel of the gas stream, and the second end positioned downstream of the direction of travel of the gas stream; and

a nozzle to discharge a mixture into the gas stream, the nozzle located adjacent the edge of the second end of the wing such that the nozzle discharges the mixture into the vortex in the gas stream at a point wherein the vortex is shed, wherein the nozzle is positioned to discharge the mixture in the direction of travel of the gas stream through the passageway of the duct to promote mixing of the mixture with the gas stream.

Attorney Docket No. 82274.472023  
Customer No. 24347

AMENDMENT AND RESPONSE  
AFTER FINAL REJECTION  
SERIAL NO. 09/753,944

51. (Previously Presented) The gas stream vortex mixing system of Claim 49, wherein the nozzle is positioned to discharge the mixture in the direction substantially opposite the direction of travel of the gas stream through the passageway of the duct to promote mixing of the mixture with the gas stream.

52. (Currently Amended) The gas stream vortex mixing system of Claim 49, wherein

the wing is a plurality of wings, each of the plurality of wings having a first end, a second end, and an upper surface, wherein

the plurality of wings are non-movably coupled within the passageway of the duct,

each of the plurality of wings are configured to shed a vortex at an edge of the second end thereof,

each of the first ends and the second ends of the plurality of wings extend into the passageway,

each of the first ends are ~~configured to be positioned~~ upstream of a direction of travel of the gas stream, and

each of the second ends are ~~configured to be positioned~~ downstream of a direction of travel of the gas stream; and

a plurality of nozzles to discharge the mixture into the gas stream passageway, wherein each of the plurality of nozzles are located adjacent the edge of the second end of one of the plurality of wings such that each of the nozzles discharge the mixture into the vortex at a point where the vortex is shed.

53. (Currently Amended) The gas stream vortex mixing system of Claim 49, wherein the second end of the wing is provided with a second edge configured to shed a second vortex at the second edge of the second end of the wing and wherein the gas stream vortex mixing system further comprises:

a second nozzle to discharge the mixture into the gas stream passageway, wherein  
the second nozzle is located adjacent the second edge of the second end of the wing; and  
the second nozzle is positioned to discharge such that the second nozzle discharges the mixture into the second vortex at a point where wherein  
the second vortex is shed by the second edge of the second end of the wing.

54. (Previously Presented) The gas stream vortex mixing system of Claim 49, wherein the wing is non-moveably coupled to the inner surface of the duct at a lift generating angle of attack such that the first end of the wing is positioned substantially upstream a direction of travel of the gas stream through the passageway and such that the second end of the wing is substantially down stream of the direction of travel of the gas stream through the passageway.

55. (Currently Amended) The gas stream vortex mixing system of Claim 54, further comprising:

a second wing having a first end, a second end, an upper surface, and a lower surface, the second wing non-movably coupled within the passageway of the duct and configured to shed a vortex at an edge of the second end of the second wing, and wherein second wing is non-moveably coupled to the inner surface of the duct at a lift generating angle of attack such that the first end of the second wing is positioned substantially upstream the direction of travel of the gas stream through the passageway and such that the second end of the second wing is substantially downstream of the direction of travel of the gas stream through the passageway; and

a second nozzle to discharge a mixture into the gas stream passageway, wherein

the second nozzle is located adjacent the edge of the second end of the second wing; and

the second nozzle is positioned to discharge such  
~~that the second nozzle discharges~~ the mixture into the vortex at a point wherein where the vortex is shed by the edge of the second end of the second wing.

56. (Previously Presented) The gas stream vortex mixing system of Claim 55, wherein the wing and the second wing are coupled to the inner surface of the duct such that the first ends of the wing and the second wing are located substantially along a plane perpendicular to the direction of travel of the gas stream through the passageway of the duct.

57. (Previously Presented) The gas stream vortex mixing system of Claim 49, wherein the upper and lower surfaces of the wing define upper and lower arcuate shapes of the wing extending from the first end to the second end of the wing and wherein the upper arcuate shape of the wing is substantially similar to the lower arcuate shape of the wing.

58. (Currently Amended) A gas stream vortex mixing system for mixing a gas stream, the gas stream vortex mixing system comprising:

a duct provided with an inner surface defining a passageway for communicating a gas stream;

a first wing having a first end, a second end and configured to shed a vortex at an edge of the second end of the first wing, the first wing non-movably coupled within the passageway of the duct such that the first end of the first wing extends into the passageway and is positioned along a plane within the passageway of the duct, the plane substantially perpendicular to a direction of travel of the gas stream through the passageway;

a second wing having a first end, a second end and configured to shed a second vortex at an edge of the second end of the second wing, the second wing non-movably coupled within the passageway of the duct such that the first end of the second wing extends into the passageway and is positioned along the plane within the passageway of the duct substantially perpendicular to the direction of travel of the gas stream through the passageway;

a first nozzle to discharge a mixture into the passageway,  
wherein  
the first nozzle is located adjacent the edge of the second end of the first wing, and

the first nozzle is positioned to discharge such that  
~~the first nozzle discharges~~ the mixture into the  
vortex at a point wherein the vortex is  
shed by the edge of the second end of the first  
wing; and

a second nozzle to discharge a mixture into the passageway,  
wherein

the second nozzle is located adjacent the edge of the  
second end of the second wing, and

the second nozzle is positioned to discharge such  
~~that the second nozzle discharges~~ the mixture  
into the second vortex at a point wherein  
the second vortex is shed by the edge of the  
second end of the second wing.

59. (Previously Presented) The gas stream vortex mixing system of Claim 58, wherein the duct further includes a plurality of walls and wherein the first and second wings are non-moveably coupled to a first and second opposing walls, respectively, within the duct along the same plane in the passageway.

60. (Previously Presented) The gas stream vortex mixing system of Claim 59, wherein the first and second wings are further defined as cambered wings.

Attorney Docket No. 82274.472023  
Customer No. 24347

AMENDMENT AND RESPONSE  
AFTER FINAL REJECTION  
SERIAL NO. 09/753,944

12

61. (Previously Presented) The gas stream vortex mixing system of Claim 59, wherein the first and second wings are non-moveably coupled to the inner surface of the duct at a lift generating angle of attack such that the first ends of the first and second wings are positioned substantially upstream the direction of travel of the gas stream through the passageway and such that the second ends of the first and second wings are substantially down stream of the direction of travel of the gas stream through the passageway.

62. (Currently Amended) The gas stream vortex mixing system of Claim 58, further comprising:

a third wing having a first end, a second end and configured to shed a third vortex at an edge of the second end of the third wing, the third wing non-movably coupled within the passageway of the duct such that the first end of the third wing is positioned along the plane within the passageway of the duct substantially perpendicular to the direction of travel of the gas stream through the passageway; and

a third nozzle to discharge a mixture into the passageway,  
wherein  
the third nozzle is located adjacent the edge of the second end of the third wing; and  
the third nozzle is positioned to discharge such that  
~~the third nozzle discharges~~ the mixture into the third vortex at a point where wherein the third vortex is shed by the edge of the second end of the third wing.

63. (Currently Amended) The gas stream vortex mixing system of Claim 62, further comprising:

a fourth wing having a first end, a second end and configured to shed a fourth vortex at an edge of the second end of the fourth wing, the fourth wing non-movably coupled within the passageway of the duct such that the first end of the fourth wing is positioned along the plane within the passageway of the duct substantially perpendicular to the direction of travel of the gas stream through the passageway; and

a fourth nozzle to discharge a mixture into the passageway,  
wherein

the fourth nozzle is located adjacent the edge of the second end of the fourth wing, and  
the fourth nozzle is positioned to discharge such that  
~~the fourth nozzle discharges~~ the mixture into the fourth vortex at a point where wherein the fourth vortex is shed by the edge of the second end of the fourth wing.

64. (Previously Presented) The gas stream vortex mixing system of Claim 63, wherein the duct further includes a plurality of walls and wherein the first and second wings are non-moveably coupled to an opposing first and second walls, respectively, within the duct and wherein the third and fourth wings are non-moveably coupled to an opposing third and fourth walls, respectively, within the duct such that the first ends of the first, second, third and fourth wings are located along the plane in the passageway of the duct.

65. (Previously Presented) The gas stream vortex mixing system of Claim 64, wherein the first, second, third and fourth wings are further defined as cambered wings.

66. (Previously Presented) The gas stream vortex mixing system of Claim 64, wherein the first, second, third and fourth nozzles are positioned to discharge the mixture in the direction of travel of the gas stream through the passageway of the duct to promote mixing of the mixture with the gas stream.

67. (Previously Presented) The gas stream vortex mixing system of Claim 64, wherein the first, second, third and fourth nozzles are positioned to discharge the mixture in a direction substantially opposite the direction of travel of the gas stream through the passageway of the duct to promote mixing of the mixture with the gas stream.

68. (Currently Amended) A vortex mixing system for mixing a combustion gas exhaust, the vortex mixing system comprising:

a combustion exhaust duct provided with an inner surface defining a passageway for communicating a combustion gas exhaust;

a first wing having a first end, a second end, an upper surface, a lower surface and configured to shed a vortex at an edge of the second end of the first wing, the first wing non-movably coupled within the passageway of the combustion exhaust duct such that the first end of the first wing extends into the passageway and is located along a plane within the passageway of the combustion exhaust duct, the plane substantially perpendicular to a direction of travel of the combustion gas exhaust through the passageway;

a second wing having a first end, a second end, an upper surface, a lower surface and configured to shed a second vortex at an edge of the second end of the second wing, the second wing non-movably coupled within the passageway of the combustion exhaust duct such that the first end of the second wing extends into the passageway and is located along the plane within the passageway of the combustion exhaust duct substantially perpendicular to the direction of travel of the combustion gas exhaust through the passageway;

a first nozzle to discharge a mixture into the passageway,  
wherein

the first nozzle is located adjacent the edge of the second end of the first wing,

the first nozzle is positioned to discharge such that the first nozzle discharges the mixture into the vortex at a point wherein the vortex is shed by the edge of the second end of the first wing, and

the first nozzle is further positioned to discharge the mixture in a direction opposite the direction of travel of the combustion gas exhaust through the passageway; and

a second nozzle to discharge a mixture into the passageway, wherein

the second nozzle is located adjacent the edge of the second end of the second wing,

the second nozzle is positioned to discharge such that the second nozzle discharges the mixture into the second vortex at a point wherein the second vortex is shed by the edge of the second end of the second wing, and

the second nozzle is further positioned to discharge the mixture in the direction opposite the direction of travel of the combustion gas exhaust through the passageway.

69. (New) A gas stream vortex mixing system for mixing a gas stream, the gas stream vortex mixing system comprising:  
a duct provided with an inner surface defining a passageway for communicating a gas stream;  
a vortex generator having a first end, a second end, an upper surface, and a lower surface, wherein the vortex generator is non-movably coupled within the passageway of the duct and configured to shed a predefined, ordered vortex in the gas stream at an edge of the second end of the vortex generator, the fist end and second end extend into the passageway, the first end positioned upstream of a direction of travel of the gas stream, and the second end positioned downstream of the direction of travel of the gas stream; and  
a nozzle operable to discharge a mixture into the gas stream, wherein the nozzle is positioned at a location to inject the mixture at a point that facilitates mixing of the mixture in the predefined, ordered vortex.

70. (New) The gas stream vortex mixing system of Claim 69, wherein the vortex generator is a wing.

71. (New) The gas stream vortex mixing system of Claim 69, wherein the vortex generator is further configured to reduce turbulence.

Attorney Docket No. 82274.472023  
Customer No. 24347

AMENDMENT AND RESPONSE  
AFTER FINAL REJECTION  
SERIAL NO. 09/753,944

19

72. (New) The gas stream vortex mixing system of Claim 69, wherein the nozzle is located adjacent the edge of the second end of the wing.

73. (New) The gas stream vortex mixing system of Claim 72, wherein the nozzle is positioned to discharge the mixture into the vortex in the gas stream at a point where the predefined, ordered vortex is shed.

74. (New) The combination comprising:

- a duct provided with an inner surface defining a passageway;
- a gas stream, moving through the passageway;
- a vortex generator having a first end, a second end, an upper surface, and a lower surface, wherein the vortex generator is non-movably coupled within the passageway of the duct between an upstream location and a downstream location of the gas stream,
- the vortex generator is configured to shed a predefined, ordered vortex in the gas stream at an edge of the second end of the vortex generator,
- the first end and second end extend into the passageway, the first end adjacent the upstream location of the gas stream and the second end positioned adjacent the downstream location of the gas stream; and
- a nozzle operable to discharge a mixture into the gas stream, wherein the nozzle is positioned at a location to inject the mixture at a point that facilitates mixing of the mixture in the predefined, ordered vortex.